REMARKS

Claims 1-6 and 10-15 are pending in the application. Claims 1, 5, 6, 10 and 13 have been rejected. Claims 10-12 and 14-15 are objected to. Claims 2-4 are allowed. Claims 1, 10, 11, 13, and 14 are amended.

I. Claim Objection

Claim 10 is amended to correct the informality pointed out by the examiner. Therefore, the applicant believes that the objection to this claim will be withdrawn.

II. Rejections under 35 U.S.C. §102(e)

Claims 1, 5, 10, and 13 are rejected under 35 U.S.C. §102(e) as being anticipated by US Patent 6,462,788 to Tan et al.

The prior art

The examiner suggested that Tan specifically teaches the detection of the color bleeding artifact based on vertical neighbors (col. 3, lines 30-34) and Tan further teaches the use of these vertical neighbors to determine a difference in order to determine if a color bleeding artifact is present (col. 3, line 40-col. 4, line 18).

Tan describes a method and system for removing color bleeding artifacts by filtering the chrominance plane of decompressed images by (1) decomposing a video frame into blocks of pixels, (2) examining blocks not containing moving edges for the likelihood of having color bleeding artifacts, where (3) the likelihood is determined by examining statistics of the chrominance values, and (4) de-color bleeding filtering at the chrominance plane (Abstract).

Tan states that it is preferred that both the adjacent neighbor statistic and the remote neighbor statistic are computed for image data of pixels neighboring only in a vertical direction (col. 3, lines 30-34). Tan also describes the use of the "adjacent neighbor statistic" to determine a difference in order to determine if a color bleeding artifact is present as well as "remote neighbor statistic" (col. 3, line 40-col. 4 line 18).

However, the "adjacent neighbor statistic" (or "vertical neighbors" as the examiner described) referred to in the above quoted part of Tan is calculated by subtraction between

adjacent chrominance values of a pixel in a 8x8 block (col. 3, lines 35-55; Equation (1)). The value x_{ij} in that calculation represents chrominance (chroma) values of a pixel (i, j). The values of the subtractions are added to get an absolute value "S" that is compared to a threshold S_{THR} (col. 3, line 48 - col. 4, line 10; Equation (2), Equation (5)). Therefore, Tan's calculation in determining the presence of a non-uniformity condition (detection of color bleeding artifacts) is performed with the chrominance (chroma) values.

Tan does not disclose a calculation of the difference between even line "frequency detection values" and odd line "frequency detection values" of the video stream to detect the presence of artifacts, where the frequency values are obtained by performing partial DFT (Discrete Fourier Transform) on chroma data.

The prior art distinguished

Claim 1:

To anticipate a claim under 35 U.S.C. §102, a prior art reference must teach each and every element of a claim. Claim 1 is amended to emphasize the difference between "frequency detection values" obtained by performing partial DFT (Discrete Fourier Transform) on chroma data and the chroma (chrominance) data values. Claim 1 requires "detecting a presence of artifacts in an incorrectly upsampled MPEG-2 video stream based on a difference between even line and odd line frequency detection values of the video stream, wherein said frequency detection values are obtained by performing a partial DFT (Discrete Fourier Transform) on chroma data and using the transformed chroma data in the frequency domain."

Applicant respectfully submits that as discussed above, Tan does not teach calculating "detecting a presence of artifacts in an incorrectly upsampled MPEG-2 video stream *based on a difference between even line and odd line frequency detection values of the video stream*", where "frequency detection values" are obtained by performing partial DFT (Discrete Fourier Transform) on chroma data. Rather, Tan's calculation is based on the chrominance (chroma) data itself. "Frequency detection value", obtained by performing partial DFT (Discrete Fourier Transform) on chroma data as in the present application, should be distinguished from the raw data (chrominance data). Consequently, claim 1 is allowable over the prior art.

Claim 5:

Claim 5 is dependent from claim 1 and further requires that "... removing the presence of artifacts comprises lowpass filtering a set of chroma data." Since claim 5 depends on claim 1, claims 1 and 5 cannot be anticipated by Tan under 35 U.S.C. §102(e) for at least the reasons as discussed above, and claim 5 adds further limitation. Therefore, the Applicant respectfully request claim 5 is allowed.

Claims 10 and 13:

Claim 10 is an independent method claim directed to a method for removing chroma upconversion artifacts in a video stream. Claim 10 is amended to emphasize the difference between "frequency detection values" obtained by performing partial DFT (Discrete Fourier Transform) on chroma data and the chroma (chrominance) data values. More particularly, Claim 10 as amended requires:

> A method for removing chroma upconversion artifacts in a video stream comprising:
>
> determining a difference between even line and odd line frequency detection values of the video stream, wherein said frequency detection values are obtained by performing a partial DFT (Discrete Fourier Transform) on chroma data and using the transformed chroma data in the frequency domain;
>
> detecting a presence of artifacts in an upsampled video stream based on the determined difference; and
>
> removing the presence of artifacts resulting in an artifact free video stream.

Claim 13 is an independent apparatus claim directed to an apparatus for removing chroma upconversion artifacts in a video stream. Claim 13 is amended to emphasize the difference between "frequency detection values" obtained by performing partial DFT (Discrete Fourier Transform) on chroma data in the frequency domain and the chroma (chrominance) data values. More particularly, Claim 13 as amended requires:

An apparatus for removing chroma upconversion artifacts in a video stream comprising:

means for determining a difference between even line and odd line frequency detection values of the video stream, wherein said frequency detection values are obtained by performing a partial DFT (Discrete Fourier Transform) on chroma data and using the transformed chroma data in the frequency domain;

means for detecting a presence of artifacts in an upsampled video stream based on a the determined difference; and

means for removing the presence of artifacts resulting in an artifact free video stream.

For similar reasons as discussed above, the applicant submits that claims 10 and 13 are not anticipated by Tan under 35 U.S.C. §102(e), and allowable over the prior art.

III. Rejections under 35 U.S.C. §103

Claim 6:

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tan et al., as applied to claim 5 above, and in further view of U.S. Patent 5,684,544 to Astle. The examiner has suggested that Astle teaches a method for upsampling chroma pixels using a 1 2 1 lowpass filter (col. 8, lines 10-15) and such a lowpass filter doubles the current chroma data sample, adds an above chroma data sample and adds a chroma value below the current chroma sample, then the total is divided by 4. The examiner asserted that it would have been obvious to one of ordinary skill in the art at the time of the invention to use the lowpass filter of Astle with the chrominance upsampler of Tan as Astle teaches the use of the lowpass filter for upsampling chrominance values (Abstract).

However, Astle performs "subsampling" instead of "upsampling" the chroma data (col. 8, lines 1-21). The upsampling is performed by a separate upsampling technique, i.e. an "isolated linear upsampling" method (col. 8, lines 22-28). Further, even though Astle may disclose a 1 2 1 lowpass filter (col 8, lines 10-15), it fails to teach, disclose, suggest, or motivate any need to use this 1 2 1 lowpass filter to lowpass filtering a set of chroma data to remove the

presence of artifacts, because using the lowpass filter in subsampling is distinguishable from lowpass filtering a set of chroma data without subsampling as recited in claim 6.

Further, claim 6 depends on claim 5, which itself depends from claim 1. The differences between the cited art and claims 1 and 5 have been discussed above relative to Tan as not anticipating either claim 1 or claim 5.

Claim 6 further requires the following elements:

> ... the lowpass filtering of the set of chroma data comprises:
>
> doubling a current chroma data sample to be filtered;
>
> adding a row above chroma data sample from directly above the current chroma sample;
>
> adding a row below chroma data sample from directly below the current chroma sample; and
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> dividing by 4.

Therefore, even though Astle may teach a 1 2 1 lowpass filter (col 8, lines 10-15), the combination of references would neither teach nor render the subject matter of claim 6 obvious. Neither Astle nor Tan discloses a calculation of the difference between even line "frequency detection values" and odd line "frequency detection values" of the video stream to detect the presence of artifacts as the present application, where the frequency values are obtained by performing partial DFT (Discrete Fourier Transform) on chroma data.

Therefore, claim 6 cannot be rendered obvious over Tan further in view of Astle under 35 U.S.C. 103(a) for at least this reason, and the Applicant respectfully request the rejection with respect to claim 6 under 35 U.S.C. 103(a) be withdrawn.

IV. Allowable Subject Matter

Applicant acknowledges that Claims 11-12 and 14-15 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form. Without accepting the propriety of the rejection of claims 1, 5-6, 10, or 13, Applicant has amended the claims presenting allowable subject matter to place them into independent form or to make them dependent from an allowable independent or dependent claim. Applicant trusts that the objection to these claims will be withdrawn.

V. Conclusion

In view of the foregoing, the applicant believes the pending application is in condition for allowance. The application respectfully requests that all rejections and objections withdrawn.

If in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is encouraged to call the undersigned at (650) 838-4349

Respectfully submitted,
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